

HIGH RESOLUTION PHOTOACOUSTIC SPECTROSCOPY OF THE OXYGEN A-BAND

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NASA's Orbiting Carbon Observatory missions require spectroscopic parameterization of the Oxygen A-Band absorption (757-775 nm) with unprecedented detail to meet the objective of delivering space-based column CO₂ measurements with an accuracy of better than 1 ppm, and spectroscopic parameters with accuracies at the 0.1% level. To achieve this it is necessary for line shape models to include deviations from the Voigt line shape, including the collisional effects of speed-dependence, line mixing (LM), and collision-induced absorption (CIA). LM and CIA have been difficult to quantify in FTIR and CRDS spectra which have been limited to lower pressure measurements. A photoacoustic spectrometer has been designed to study the pressure- dependence of the spectral line shape up to pressures of 5 atm, where LM and CIA contribute significantly to the A-Band absorption. This spectrometer has a high signal-to-noise (S/N) of about 10,000 and frequency accuracy of 2 MHz. In addition, temperature-dependent effects on the line shape are studied using PID-controlled cooled nitrogen flow/ heater system. The latest acquired spectra and analysis are reported here.